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ABSTRACT

Problems in mathematics instruction in Thailand that are related to language include the simultaneous use of both traditional Thai numerals and Hindu-Arabic numerals, misunderstanding of mathematics problems for cultural reasons, and/or difficulty in understanding problem context. Research has shown that elementary and secondary school children have little difficulty with arithmetic concepts when problems are presented in number form but they do poorly on word problems, indicating that abilities in concept formation in science and mathematics are related to language skills. In some cases, difficulties arise when familiar words are given a different meaning in a mathematical context or when problems are indistinctly worded. The introduction of logic into mathematics instruction has given specific meanings to many simple terms and has provided terms for specific mathematical concepts. However, instruction in logical thinking and accurate communication is the responsibility of all disciplines, with the help of language instructors. Mathematics and language cannot be taught in isolation. (MSE)

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SEAMEO REGIONAL LANGUAGE CENTRE
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LANGUAGE PROBLEMS ACROSS THE SCHOOL MATHEMATICS CURRICULUM IN THAILAND

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LANGUAGE PROBLEMS ACROSS THE SCHOOL MATHEMATICS CURRICULUM IN THAILAND

by

Suchart Ratanakul

1. Historical background

1.1 Important role of Mathematics

Mathematics has had its important role in the education of Thailand from the very beginning of our history of education tracing back about 700 - years. During the early years of the era of our ancient education, mathematics instruction was confined only in Buddhist temples. The priests and the Brahmin were the original mathematics teachers. They used Indian textbooks in their teaching. Arithmetic and algebra were written in verse, following the Indian practice, because poetry is easier to memorize than prose, and the people preferred learning by memorizing. Two examples of arithmetic problems in verse form are given below.

Out of a swarm of bees one-fifth part settled on a Kadamba blossom; one-third on a Silindhra flower; three times the difference of those numbers flow to the blossom of a Kutaja. One bee, which remained, hovered about in the air. Tell me, charming woman, the number of bees.

Eight rubies, ten emeralds, and a hundred pearls, which are in thy earrings, my beloved, were purchased by me for thee at an equal amount; and the sum of the prices of three sorts of gems was three less than half a hundred; tell me the price of each, auspicious woman.

1.2 Thai numerals and Hindu-Arabic Numberals

Despite studying and practicing mathematics by using the Indian methods, Thailand has its own numerals. Up to the present time no historical document has been found that gives information about the exact origin of thai numerals. It was deduced that the Thai numerals were invented and have been in use since 1283 when King Ramkamhang invented the Thai alphabet. The Thai alphabet is based on the adaptation of the Cambodian which originally comes from that of the Southern Indian. The Thai language is a monosyllable language.

After 1283 the form of the Thai numerals changed only slightly due to the introduction of the printing press in Thailand. In the old days we used only Thai numerals but later on after the dawn of European influences we have been using both Hindu-Arabic and Thai numerals. At the present time Thai children learn how to write and read Thai numerals in their early years of their schooling but Hindu-Arabic numerals are commonly used in their practice in schools. One reason for such practice may rest on the fact that Hindu-Arabic numerals are easier in writing, reading, and printing.

2. School Mathematics Today

Mathematics has been taught as a compulsory subject in our elementary schools and also compulsory for the first two years of secondary schools. Never theless, it is admitted that the result is

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rather unfavourable. It was found in some research findings that our elementary school students did not do very well in mathematics and their weakpoints lie in the fact that they always lack the understanding of the word meaning used in the contexts of the problems.

Some main reasons that come across this issue may be due to the fact that mathematics itself is a language- a universal language, a thinking language, and a calculating language as well. It has emerged out of ordinary language and is in itself a language which has its own symbols and meanings.

We use today two kinds of writing, for a symbol represents either a sound, as "r" or "o", or a concept, as "3" or "4". Accordingly, we may distinguish between phonetic writing and symbolic writing (ideography). All symbolic writing, as we know today, originally arose from a pictorial writing which reproduced only concrete perceptible things or events. The question now arises: out of an intuitive pictorial writing, how could an abstract mathematical formalism detach itself with conventional special symbols for quantities and operations? Or out of the letter writing which followed the phonetic picture of the words, how could the concept symbols of mathematics spring up? Both are difficult to understand, since the mathematical symbols do not lie, so to speak, in the direction of the natural development of language. And still the presence of ideographic writing is essential for the unfolding of mathematical thoughts.

As far as researches in the learning process of science and mathematics concepts of the school children in Thailand are concerned, it can be stated that in Thailand there are still quite a small number of researches done in this area, and even these few available seem to be scattered.

A nationwide study on primary school curriculum revealed that children in grade 5 achieved well on problems dealing with number facts (simple computation) in the arithmetic test but did poorly on problem solving with problems in story form.

Another research attempting to investigate into some mental abilities related to pupils scholastic aptitute in learning science and arithmetic was made some years ago using 7th grade pupils enrolled at five municipal schools as samples. One interesting finding was shown that there were some common factors in both science test and mathematics test and the language ability was one of those common factors.

Another study comprising a sample of 550 fourth and seventh graders in Bangkok and Surin also revealed that abilities in concept formation of Thai children was highly related to reading abilities (comprehension and speed).

Some interview made by Srinakharinwirot University graduate and undergraduate students majoring in mathematics also confirmed that most of our students in elementary and secondary school cannot solve problems because they do not comprehend the problems. Such problems may fall into different categories as the following:

1. Problems in understanding the word meaning used in technical terms for different topics or concepts.

2. Problems in understanding word problems. This kind of problems may be exemplified by the following:

2.1 A girl has 76 rose apples. She gave 22 of them to her sister. She then sold 40 fruits of the rest. How many rose apples are left?

2.2 A boy is now six years old. How many more years in the future will the boy be eighteen years old?

2.3 A boy's age is twice that of a girl. Now the girl is five years old. How many years is the boy older than the girl?

2.4 Five birds were singing on a branch of a tree, three of them were shot dead. How many birds were left?

Some children answered that two birds are left because they thought of living birds while the others who thought about the dead birds answered 3.

After the revolution in school mathematics in the second half of the 20th century, Thailand has been facing with more problems in mathematics education in all school levels. The language and symbolism have become more precise and more sophisticated. Sets and logic are the most visible traits of change in our curriculum. The concept of "set" which had been used with very simple and concrete meaning in ordinary language has become a technical term in mathematics and has extended its meaning into an abstract sense so that a member of a set may be concrete or abstract as darkness and sweetness. Even beyond the imagination of non-mathematicians is that a set may have no member at all and this particular set is called "empty set" or "null set" and it is as important or even more important than any other sets with members.

The introduction of logic in school mathematics has brought in some specifi concrete meaning of the simple words such as "one", "some", "all", "each" and "every" as well as the logical meanings of "and", "or", "if-then", and "if and only if". This phase may be illustrated in solving the equation $(x-2)(x+3)=0$. We say that the equation $(x-2)(x+3)=0$ has two solutions, i.e., x is equal to 2 or -3, not 2 and 3. The word "and" is not permitted in this case because the law or the rule of substitution allows only one number to be substituted for one variable at one time.

The use of the terminologies "if-then" and "if and only if" (iff) in the mathematical sentences occupies the most important part of logical principles directed toward an understanding of the nature of mathematical proof and of the character of mathematical abstractions. In traditional teaching logical considerations were reserved for the study of geometry. Algebra was simply an affair of routine calculations. An explicit study of the elements of mathematical logic and its symbols is new to secondary school mathematics. While the start of the study is in the usual vehicular language, it cannot stay there, for everyday language is too loose for correct communication and rational reasoning. But mathematics teachers alone cannot be charged with this. It should be an inter-disciplinary study with the langnage instructors. Once the application of logic to mathematics is clearly understood, the difficulty of its application to other fields will be diminished.

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One of the new disciplines emerging from old ones and has entered in school mathematics unavoidably is the computer science. The electronic computer has invaded all aspects — public, private, and industrial of modern life. It not only computes, but through programming operates and controls automatic manufacturing machines, teaches pre-conceived instruction, and controls the communication systems of the world. New uses for it are being discovered daily. The making of flow charts of algorisms, the programming of mathematical problems and most particularly the computer language have entered our school teaching.

We have finally reached the point where language comes across mathematics and mathematics comes across language. Briefly speaking, both language and mathematics get across the curriculum hands in hands. Therefore, they cannot be separated from one another.

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